Md.
378.73
M36J
v.1
#3
g

Maryland Agricultural College Bulletin

JANUARY-MARCH, 1905

Vol. 1 No. 3

THE MARYLAND AGRICULTURAL COLLEGE

COLLEGE PARK, MARYLAND

ISSUED QUARTERLY

Entered at College Park, Md., as second-class matter under Act of Congress, July 16, 1894.

LIBRARY—COLLEGE PARK

A Town School-Garden.
(True, Office of Exper. Stas., U. S. Dept. of Agr.)

A Country School-Garden.
(Photo. by Crosby, Office of Exper. Stas.. U. S. Dept. of Agr.)

NATURE STUDY.

Prof. W. N. Hutt.

To the Teacher:

WHAT IS NATURE STUDY?

Men and women are but grown up children and like children are looking for happiness. That which is not pleasurable to us we generally avoid and if we can help ourselves do only what we like. But with the little people under our control, we usually expect them to do what they do not like because it is education and good for them. There seems to be one rule for the man and another for the small boy. A farm boy once told me that the only difference between a man and a boy was that a boy had to do as much work all day as a man and then do the chores after dark. That boy wanted to be a man. Less than a generation ago the best kind of education was considered to be that which was most distasteful to the pupil, like the most bitter medicines that were supposed to be most efficacious. The result of forced education, or "lickin' and larnin'," was that the weaker or less spirited pupil took his dose, while the stronger, more spirited, and generally brighter pupil either made the teacher's life a burden or left literally "for green fields and pastures new." Such was the "Old Learning," and it went on till the question arose whether the untamed truant did not "find tongues in trees, books in running brooks, sermons in stones, and good in everything," while the unwilling drudge at school missed the best of things.

Is there such a thing as forced education? Can the child be made to learn what he does not like? We grown-ups never make a success of what we do not like. Why classify people on the basis of size? "The New Learning" which for want of a better name we call Nature Study, teaches that education is possible by means of things that children do like.

WHY CHILDREN "HATE" SCHOOL.

It is not unnatural that children should dislike school, because the schools deal in abstractions, while the child knows only things. The schools use coin that's not current with him. It's too bad that we have to learn from books rather than from the things themselves. It's a shock for the child to come out of the world of realities to mere words, and forms, and signs for things. He feels that it's all a sham and delusion. The real world is outside of the school-room and it is little wonder his thoughts are in the green hills far way instead of on moods and tenses and on ratio and per cent. It is the good teacher that makes the passage from the great out-of-doors to the class-room with the smallest bump possible. Better is that school-room that has the smell of woods and fields.

Any boy coming to school has considerable knowledge of geography. Probably he never heard it called by that name but it's the same article nevertheless. Has he not followed up the brook to see where it came from? Has he not been back of the hills that can just be seen from his home? And has he not fished in the great pond that runs the mill? The world that he has seen, how readily it can be connected by the judicious teacher with the larger ideas of the rivers, the mountains, and the lakes till the farm grows into the county, the county to the state, the state to the nation, and the nation to the continent. What on the other hand is likely to be the result when the child's local geography is not received as current coin by the teacher and instead he is introduced to the Copernican theory, the solar system, and asked to learn reasons for the world being round? Is it much wonder that the child feels homesick and thinks fearfully of the falling-off place? Is it not better to know what is right around us than to know Brazil or Egypt or the fixed stars?

NATURAL EDUCATION.

The child mind unrolls like a fern leaf, its fuller powers coming into use one after the other. First, the child notices things, it knows not why, it simply sees. As soon as able, it copies what it sees. First of all things the child wants a doll. But it's only a doll to grown-ups—it's

the child's "baby." The child notices and does what its mother does: and is not the care for the baby itself the first thing it ever saw and learned? The accuracy of infantile observation is seen in the full round of household duties performed on the doll "baby." It is fed and bathed at fixed periods, often much to the injury of its waxen face and sawdust body. Sometimes the "baby" is taken sick and is watched over and tended with all the details of maternal tenderness. The child deals in actualities and its sorrows are as real and poignant as its little heart can feel. At night, after the "now I lay me down to sleep," its "baby" is tucked in and kissed and left with childish injunctions to go to sleep. The child's first thought on waking is its "baby," which it dresses and makes ready before it thinks of its own needs. After breakfast the child prepares for dinner. The sweeping out of the playhouse, the washing and hanging out of "baby's" clothes and the making of mud pies are only a few of the duties of the infantile household. And so "baby's" "shortening" and weaning and first pair of heeled shoes are all repeated in the child life. Not the slightest detail escapes an observation as keen as a scientist's and an imitation as accurate as an actor's. We shall see later what becomes of these powers.

While with the mother the ideas and habits of the child, whether boy or girl, are the same. As soon as a boy's legs become sturdy enough to follow his father he is "papa's boy." He wants a dog and horse and wagon, and is a farmer or merchant or lawyer according to the occupation of the parent. It is at this period of child life that fond parents see in their children great precocity and evidence of genius. The keenness of perception of the average child is often a marvel to the dulled faculities of its parents, dulled probably by having their enthusiasms and impulses chilled by the cold hand of the school-master. A little later in child life come the questions concerning the cause of things, the reasons for this and that, those scores of questions that would puzzle a philosopher much more the astonished parents. The child is a realist and forms his conclusions from the concrete things, that he knows. A little boy had been told in Sunday-school that God is everywhere. After coming home his mother noticed him and a neighbor's boy very busy in the backyard. They had the ash barrel down on its side and the neighbor's boy was poking vigorously in the ashes while the other was watching very closely. On being asked what

they were doing the little fellow answered, "teacher told us that God is everywhere," and if he is everywhere he's in the ash barrel, and Jimmie's poking and I'm watching for Him to come out." If a man cannot grasp the idea of the infinite, how much less the child whose knowledge is bounded by his visible horizon.

As a result of the question period the child's horizon becomes very much enlarged. He passes the bounds of his small known world unto the realms of fancy. And what a glorious world it is into which he enters! It is during this period of child life that the growing mind finds an all-absorbing interest in the Tales of the Arabian Nights, Alice in Wonderland, the Henty books, the stories of J. Fennemore Cooper and similar books. As a result of an awakened imagination impressions made at this time are very deep and lasting. The child can observe accurately and memorize correctly, but at that time gives little consideration to cause and effect. The reasons for things, and the powers of analysis and synthesis are the latest maturng faculties of the mind. It is patent to every teacher that children can observe more closely and accurately than their seniors, while analysing and reasoning may be entirely unintelligible to them. The average child learns his arithmetic in a routine way and attempts geometry by memory only to break down hopelessly on the *pons asinorum.*

The morphological sciences, which require, most of all, accurate observation, may be taught successfully to very young children. Of course the children should not be told that they are studying Entomology, and Botany, and Zoology, and Ornithology. But they would nevertheless be learning a great deal of those aforesaid sciences. They would be learning elementary natural science, or as it is better termed, Nature Study. Any child can easily learn the parts of a flower, the calyx corolla, stamens and pistil, or the metamorphoses of insects, the egg, larva, pupa and imago. By the use of these simple terms the child is able in his daily life and pleasures to gain a vast amount of scientific training and information and unconsciously to acquire an aesthetic appreciation of nature that make life joyous. The child cannot learn science in a more pleasurable and profitable way than by getting a start in Nature Study. It might be said to be the beginning of all knowledge. From this beginning the growing child is daily acquiring a knowledge of his surroundings that later becomes the basis of more serious study of

science. It is a mine of wealth for manhood's use. And even if the child never enters college as a man, he has, nevertheless, acquired an appreciation of nature and art that makes life doubly worth the living. To the adult student who has not had this intimate personal contact with nature he finds his mind unstored and his eye untrained. He has to start handicapped, where the child began. Prof. Bailey says "animals come before zoology, plants before botany, fields and rocks before geology, words before language, religion before theology. Experience should come before theory." The time for education is the period of receptivity.

THE UNITY OF KNOWLEDGE.

A great deal of the pleasure, and also the power of many valuable subjects in courses of study in schools, is lost by having each subject taught as if it were in itself a distinct department of knowledge. There is no department of human knowledge that is separate or distinct in itself. All knowledge is connected and relative. There is no such thing as an isolated idea. But in public schools, grammar is taught as if it had no reference to literature, and arithmetic as if it had no connection with science. In our high schools, it could not be judged from the curricula, nor often from the methods of teaching, that any of the subjects had any connection with each other or with "the great forgotten world outside." How different and artificial an atmosphere the school-room has in comparison with that of the real resorts and haunts of humanity. There is not a single fact in chemistry that does not strengthen the laws of physics. The rocks and strata and outcrops of geology are the foundations of all practical and applied science. The Greek and Latin roots are the underground radicles of a perfect growth in literature. The discovery of electricity binds the continents in cables, ties city to city, and enmeshes the habitations of men in a network of telegraphic and 'phonic connection. The chance finding of the X-ray was not only of value to physical science. It entered the realm of chemistry, medicine, surgery therapeutics, etc., and the end is not yet. So examples of the correlation of knowledge might be multiplied *ad infinitum*. There is not a single art or 'ology but is mutually dependent in the correlation of things. The school seems to be the only place where ideas are isolated and independent.

PRACTICAL EDUCATION.

A century ago or less, education consisted in swallowing unquestioningly and digesting what was offered as intellectual food. The classic languages and logic comprised almost the total bill of fare. This was education, but of how little value for the practical business of life. Except for literary men to whom classics were of value a set of arbitrary symbols might have been invented and memorized and the same amount of mental training acquired. Today we know that mental training may be obtained by the study of subjects, which will be of future use to the average man. It was little wonder that under the old regime the "birch" was a very necessary persuader in educational work. Tom Brown found truancy and bird nesting much more to his taste than the work of the school-room.

This is a practical and hard-headed age, and unless we see some future value accruing to us, we are very loath to bestow present labor. The farmer would not sow did he not count on a golden harvest. Is it any wonder that the school-boy should be loath to study many of the subjects in the school catalogue for which he can see no future value? True his vision is limited and he may not be the best judge of what present training makes for his future welfare. In this matter the thoughtful teacher can do wonders towards making any subject desirable to a pupil. The declensions and paradigms of a classic grammar are naturally distasteful to a child, but if the teacher takes the trouble to show him that the first word of the first declension, regina, is the origin of regal, regnant, regal, etc., in common speech, why he sees the utility of it all and is made a willing student. By introducing daily a little etymology and philology those dry classic roots may be made to blossom into beauty. Of course it would not do to tell the student he was studying etymology and philology or he might exclaim like the Psalmist "such knowledge is too wonderful for me, it is high, I cannot attain unto it." Later in his course when the student comes to take up these subjects he finds them not cyclops to be overcome, but old friends with whom a more intimate acquaintance is to be sought. From such tuition the student sees the unity of all knowledge. His angle of vision is widened. He did not encounter the dead wall of a new department of knowledge, for the thoughful teacher had removed even the "bump."

But on the other hand how many a student has perished in the labyrinth of sines and cosines and tangents because the teacher did not tell him that by them he could travel from a planet to a fixed star. How many a young searcher after truth has mired in the quicksands of botanical verbiage and never learned the open secrets of vegetable life! And so in every branch of learning it is the practical and useful that appeals to boy and man alike.

The best teacher is the one who makes his subject most knowable. This may not be and generally is not the man who knows most about the subject. It seems to be one of the failings of modern science that it enshrouds itself in a verbiage and technicality that makes it quite unknowable to the great mass of mankind. If science has any message to deliver it should be given in plain understandable language or its power becomes abortive. I believe there is very little science that cannot be understood by the average man if translated into the language of common speech. In being stripped of technical terminology and popularized science need lose none of its accuracy and force. Natural science if stripped of its verbal impedimenta may be readily taught to children in the grades. Any sharp-eyed boy or girl knows a good deal of biological science. Once while holding a series of Farmers' Institute meetings I came to a little country town where the public school was turned loose on us. There were three speakers on the program. I was on for "filling." For an hour, the first speaker gave a very interesting and practical address to the farmers present on clover growing. Though not caring for practical clover growing the children stood it pretty well. It was new to them. The second speaker followed for three-quarters of an hour on dairying. Though a very valuable address to the farmers present it was less interesting to the children and considerably more tiring. By the time it was over many of the little fellows had the "wiggles" pretty badly. I knew enough of the small boy to know his endurance has a limit and I saw that at that time it was about reached. I saw that my usual hour on orchard management would be a difficult one for me, and in self-defence I asked the chairman if he would let me talk to the children. Permission being granted, I produced a box of insects that I used when talking on spraying. Of course every child was curious to know what I had in that box and it was not hard to get them in circles close around me, and the parents

formed several larger circles around them. I showed the specimens and asked questions about them and soon the little fellows were vieing with one another in telling me what they had seen these "bugs" do. This led naturally to plants and flowers the children had seen and where they grew. The birds they knew by their colors and nests. They had seen several kinds of fish in the brooks. The hour passed very quickly, the "wiggles" entirely forgotten and a band of happy children went home talking all the way about plants and bugs and birds and fishes. The parents were surprised at the many facts of natural science their children had picked up, that had escaped themselves entirely. I told the children little; I only asked questions; but I learned more in that hour from those little fellows that I ever got in any hour of college lectures. I got a text for a Nature Study sermon that I preached over hundreds of miles. To use the language of techinal science, we had been discussing phenomena in Entomology, Botany, Ornithology and Ichthyology. Had I announced that fact I would have scared those children out of all receptivity and failed in hiding my ignorance from their parents. In the words of the great Apostle to the Gentiles "He that speaketh in an unknown tongue edifieth himself. * * * * So likewise ye, except ye utter by the tongue words easy to be understood, how shall it be known what is spoken? For ye shall speak into the air. There are, it may be, so many kinds of voices in the world and none of them is without signification. Therefore, if I know not the meaning of the voice, I shall be unto him that speaketh a barbarian, and he that speaketh shall be a barbariam to me." Surely the Apostle Paul had a prophetic vision of modern science when he said this. Then he sums up by saying "I had rather speak five words with my understanding, that by my voice I might teach others also, than ten thousand words in an unknown tongue." I Cor. 14.

THE REGENERATION OF THE SMALL BOY.

Kindly-disposed, but ill-informed, people have often remarked on the "inherent cussedness" of the small boy. It is to them a sign of great depravity that boys rob birds' nests, pull off butterflies' wings, put pins through beetles, kill frogs and show various other signs of "savagery and vandalism." But the "bad boy" is neither a savage nor a vandal,

but he lives nearer the physical basis of life than do his seniors. This badness is almost invariably an indication of his energy and ability. It's only the sleepy boy that is no good. All children have the collecting fever as they have measles. The acquisitive faculties develop early in the human race. The kind of collection a child makes is determined by heredity and environment, but collect, he will, whether it be marbles, jack knives, coins, postage stamps or birds' eggs. The boy of my choice is the one who impales insects and gathers birds' eggs. His cruelty and savagery are only indications of his ignorance and incidentially of our own. He collects because his clearer vision sees some value there that to our dulled eyes is hidden. His whole attitude is that of a searcher after truth. If we have the light, shall we deny it to him? His regeneration is in those butterflies' wings that he has so ruthlessly torn off. A glass kindly and carefully placed on them will reveal their marvellous structure and initiates the "savage" into a realm the wonders of which he never dreamed of before. He is amazed, ashamed, convicted, converted. It often takes but a single act of a thoughtful, sympathetic teacher to change the vandal to the friend and protector of all animal life. And he stays converted. But once introduce a child "through the ivory gates and golden" into the fairy treasure-house of nature and he never loses the magic spell. He needs no urging; he can't be held back; for like Whittier's "Barefoot Boy," he is near to the great heart of nature. "Hand and hand with her he walks, face to face with her he talks." Of course, he won't kill things then for they have become his personal friends.

SELF-EDUCATION.

It has often been stated, and probably not without reason, that our schools and colleges turn out machine-made men, men who think other people's thoughts rather than their own. The putting of all kinds of students through the same curriculum is often forcing square pegs into round holes. The constant study of books, the systematic thinking of other men's thoughts fosters routine or machine thinking and makes machine-men. This defect has become somewhat lessened by the increase of optional courses of study. But even today there is a preference for self-made rather than college-made men. Business men claim

the non-college man is untrammelled by precedent and has more initiative and creative power. Is it not an irony of language that only great creative intellects are designated as thinkers? What then are we ordinary men, repeaters? We are possibly human phonographs whose cylinders bear the trade-marks of the schools. What is the cause of it all? Books, books, only books! Signs and symbols for actualities. True education does not consist in terminology, nomenclature and symbols. The text books must be made our servants—not allowed to become our masters. All true education is self education. Books are useful to stimulate thought, but one thought of the student's own is worth more to him than libraries of other people's ideas.

The best that books and teachers can do is not to inculcate any set of ideas, but to give inspiration, appreciation and sympathy. If by aid of books or teachers the child comes into sympathetic touch with nature, his conversion is complete; he becomes a self-educator.

HOW TO TEACH NATURE STUDY.

Now, my dear teacher, in all your work try to make education as unconscious and as pleasurable as possible. See to it that the school-room is not a place for the repression of all natural impulses and desires. Don't become a slave to the text book. Deal in real things as far as you can. Don't discourage the child. In teaching literature or a reading lesson have, if possible, to show the children, the things about which the lesson treats. Models and pictures will do when realities are not available. A few minutes' trip from the school-room will often serve to see things that cannot be brought to the school-room. In this way the impressions of ear and eye may often be reinforced by smell and taste and touch. Use as far as possible every avenue of education. Encourage the children in judicious collecting. Have them bring things they have discovered into the class-room. Weave these things into a lesson so that the child feels that his discoveries are a real part of the school work.

COLLECTION CABINETS.

A child is always delighted and feels that he is a part of the school when he is helping teacher. This work may be encouraged by having the things the child has discovered stored in a school cabinet. The treasures in this cabinet will increase astonishingly in number, variety and value and become a useful supply of materials for class illustration. When in public school work, a little girl brought me in one day the remnant of corroded metal from a telegraph battery. It had a very weird distorted appearance and the peculiar green of the copper solution gave it a sort of uncanny lustre. The little girl asked if it wasn't a meteor, or shooting star. I had to laugh but on looking at the thing again I could not but say it was not an illogical conclusion. A bit of real meteoric iron was procured, and its effect on a compass was a great source of wonder and delight to the children.

AQUARIA AND TERRARIA.

But above all things children find an endless delight in living animals. The teacher who establishes an aquarium or terrarium in the school-room will have no cause to enforce truancy regulations. The aquarium may be simply a large, wide-mouthed glass bottle and can be stocked with denizens proportionate to its dimensions. Sand and earth may be put in the bottom and on it placed small clams, shell fish and water snails. A few water plants may be started in the soil and a few small fish like minnows, stickle backs, small shad, etc., put in with some skaters and water beetles for the surface. The water may be changed when found necessary, but the plants will keep it fresh for a long time. A better and more commodious aquarium may be made from a large candy jar or battery solution glass. A very nice aquarium may be made by an ingenious boy from slates, by putting in glass in the side frames instead of the slate, and cementing the joints. The terrarium is the same vessel without the water and in it small land animals and insects may be kept. The "wigglers" of mosquitos may be reared in a glass tumbler and will afford endless instruction and delight to the children. With such an equipment the teacher need not lack for nature

study materials nor texts for lessons. The fullest work, however, in Nature Study is done in "God's out-of-doors."

SCHOOL GARDENS.

A very valuable adjunct to a school is a garden where the children are encouraged in growing things. A few packages of vegetable and flower seeds distributed among the children will give rich harvests of pleasure and experience for the little folk. It is a great change and rest from class-room work and makes them fresher and brighter for other studies. The various side interests that arise in the work will be of great value; the weeds to be overcome, the insects to be studied. Some plants may be raised as breeding grounds for insects and their metamorphoses can be watched.

EXCURSIONS TO WOODS AND PARKS.

For a fuller knowledge of nature we must study her in her secret haunts. The fields are good, but best of all is the forest primeval. There the little people of the wild are found in all the freshness and beauty of freedom. The teacher does not need to look for texts, for the children will find them everywhere. But the teacher will have a great many questions, some that he can answer, many more than he cannot. Just here let me say that the successful teacher is always a student. He must read, he must study, he must observe; as soon as he ceases to study his decadence has begun. The teacher who does not study his work is a failure in kindergarten or in university, and the pupils always know it. He must study to be ready for those questions in all lines, but he must also have the courage and honesty to say "I do not know." On a Nature Study excursion the work should not be taken up systematically; we want to get away from system that smells of the school-room, we are now looking for inspiration. The first thing that is of interest is the text, be it flower or bird or fish or insect. Make things interesting. Do not try to find a reason for everything. The unknown has a value too. We would tire of nature were her secrets to be had without searching and had she not wonders past finding out. In cities where natural woods and fields are not to be had the civilized

forests, or parks will have to take their place, and the zoo will furnish the animals. In our best kept parks the vegetation is left in a more or less natural condition while the protection to birds and game often makes them more approachable than in their wild haunts. Is it not more up-to-date and pleasurable to hunt with camera than with gun?

USE OF NATURE STUDY.

As virtue is its own reward so is Nature Study its own reward. Nature Study can only result in nature sympathy, for the appetite grows with what it feeds upon. The result is a keen personal sympathy with every natural object and phenomenon. In Shakespeare's "As You Like It" he tells how the banished duke and his courtiers driven from their capital took refuge in the forest of Ardennes. At first their banishment was very painful to them but as they came in closer touch with their natural environment they found "tongues in trees, books in running brooks, sermons in stones and good in everything." They then began to commiserate their victors in the gilded capital. One morning with bow and quiver as Jaques, a courtier, was hunting his breakfast, a deer appeared in an open glade before him. He raised his arrow to the string and in taking aim he noticed the splendid spread of antlers, the majestic head and beautiful eye of the quarry. He gazed a moment then let his weapon drop and the deer passed on into the forest unharmed. Turning to his page he said "I go hungry today. I cannot slay so noble an animal."

To the modern who hunts with camera rather than with gun, this old earth become instinct with life, each plant, insect and animal becomes a personality.

THE ETHICAL SIDE.

There is an ennobling effect from contact with nature. It makes the heart devout and reverential to come in contact with the great and beautiful works of the Creator. The southern part of Australia which was formerly the British penal colony has now become a self-governing province of the Empire. Many a man who was formerly the terror of White Chapel or of Hound's Ditch has been regenerated by being

placed face to face with nature in that distant land. Often the origin and history of wealthy and worthy citizens was not known till on being prepared for burial the C of the convict was found branded on their breasts. The worship of nature in field and woods turns man from nature to Nature's God.

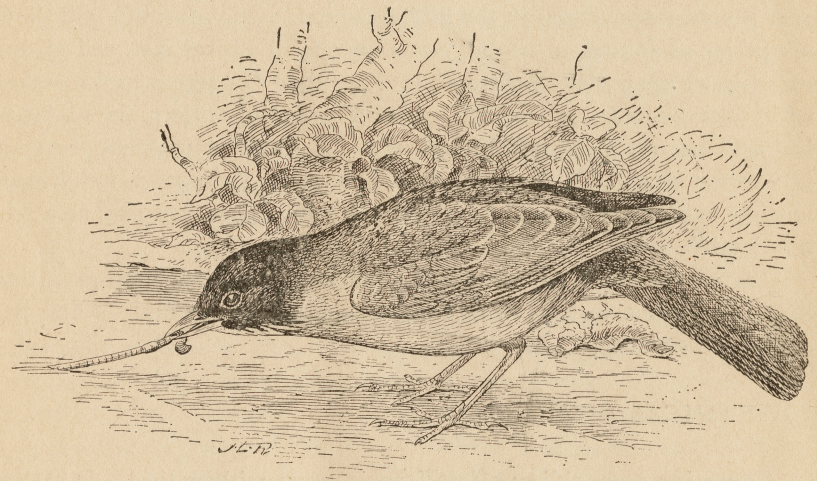
SUGGESTIONS FOR NATURE STUDY WORK.

1.—Notice plant societies; the kind that like the dwellings of men, the schoolyard, the dooryard; the plants that love the roadside, those that live in low places, in the pine wood and in shady places.

2.—Notice the trees that the woodpeckers visit, what they do to them and how it is done.

3.—Notice the flight of birds. Try to identify each kind of bird by its flight, by its song or cry and by its nest.

4.—When you hear noises by insects try to find out each kind of insect making the sounds.



Robin Redbreast's Method of Getting His Breakfast.
(Cut from Beal, Biological Survey, U. S. Dept. of Agr.)

5.—Notice the way weed seeds and burs have of travelling about in the world.

6.—How are the seeds and nuts of different kinds of trees planted? Where?

7.—Tell the trees by their leaves.

8.—Study the beach by the tide and ripple marks.

9.—A brook is a river in miniature.

10.—Watch the "skaters" and "wigglers" in a pond.

11.—What kinds of insects fly in the day time? What ones at night?

12.—What kinds of insects do you find along the shore, in the sand, on the rocks?

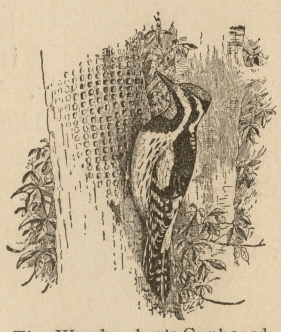
SUGGESTIONS FOR WINTER.

1.—Try to tell the kinds of trees by their bark and buds.

2.—Watch the development of insect pupae in winter.

3.—Study trees at night by their form on the skyline and the spread of their branches.

4.—Study animals by their tracks in the snow.



The Woodpecker's Cupboard.
(Cut from Beal, Biological Survey, U. S. Dept. of Agr.)

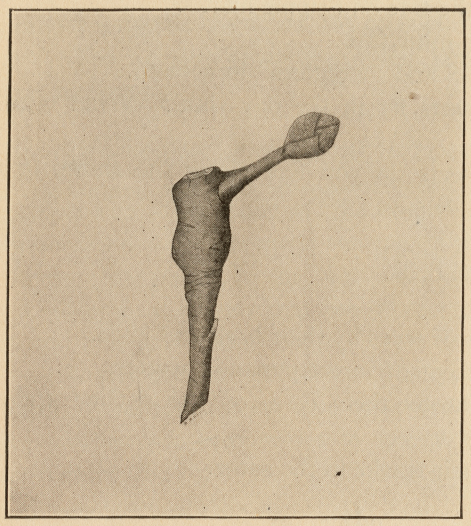
5.—The weeds of a fence-row make an interesting study for winter botany.

6.—Notice the return of the birds. Which come back first?

7.—What birds stay all winter? Where do they live and what do they feed upon?

8.—Watch the buds shed their winter overcoats.

FOR SPRING WORK.



(Fig. 1.)

A very interesting line of Nature Study is to watch the growth and history of a fruit bud. Fig. 1 shows a fruit bud of an apple with its winter overcoat on. By the way, it is a fur overcoat, too. We know that this is a fruit and not a leaf bud because it is so plump and round that we can guess there is something more than leaves in it. As soon as the warm days of spring come the bud sheds its winter coat; bursting it off, buttons and seams and all, for it never wants to use it again. Then we can see the little calyx and four plump, pink, flower buds like Fig. 2. A day or two of the beating of the strong sunbeams and the buds are opened wide out into pretty pinkish white flowers, like those in Fig. 3. The pretty petals are a signboard to the busy bees that there is some sweet nectar in the flower cups for them and the whole orchard is fragrant with perfume. As the bees stoop to sip the nectar their furry bodies are dusted with the yellow pollen from the little nodding anthers and as they go and come they dust

(Fig. 2.)

the pollen on the sticky stigmas below. In a few days the ground is white with fallen petals, for they have done their work and the bees

(Fig. 3.)

have gone to other kinds of flowers. Then the little apples show as in Fig. 4. But, if every fruit bud bore four apples or more, the tree would

(Fig. 4.)

be broken down with the weight, and die. So old dame nature blows off all but or two.

In Fig. 5 she has left one apple. Now if the insects and diseases don't get it by fall the sunbeams and the raindrops will have made it into a large, bright, juicy apple, such as all little boys and girls like.

(Fig. 5.)

Amateur Gardeners.
(Cut from True, Office of Exper'l Stations, U, S. Dept. of Agr.)

IF YOU WISH TO BECOME

A Scientific Farmer,
An Engineer,
A Chemist,
A Teacher.

In short, if you wish to secure a scientific and literary training that will fit you for an honorable pursuit in life,

—THE—

Maryland Agricultural College

Offers Exceptional Advantages.

TUITION FREE IN ALL COURSES.

THE EXPENSE FOR
BOARD, BOOKS AND INCIDENTALS IS VERY MODERATE.

Spring Term Opens Tuesday, April 25, 1905.
Fall Term Opens Thursday, September 14, 1905.

The College is located on the B. & O., and City and Suburban Electric Railroads, eight miles north of Washington, D. C.

For Catalogue, and other Information, Address

R. W. SILVESTER, PRESIDENT,

COLLEGE PARK, MD.